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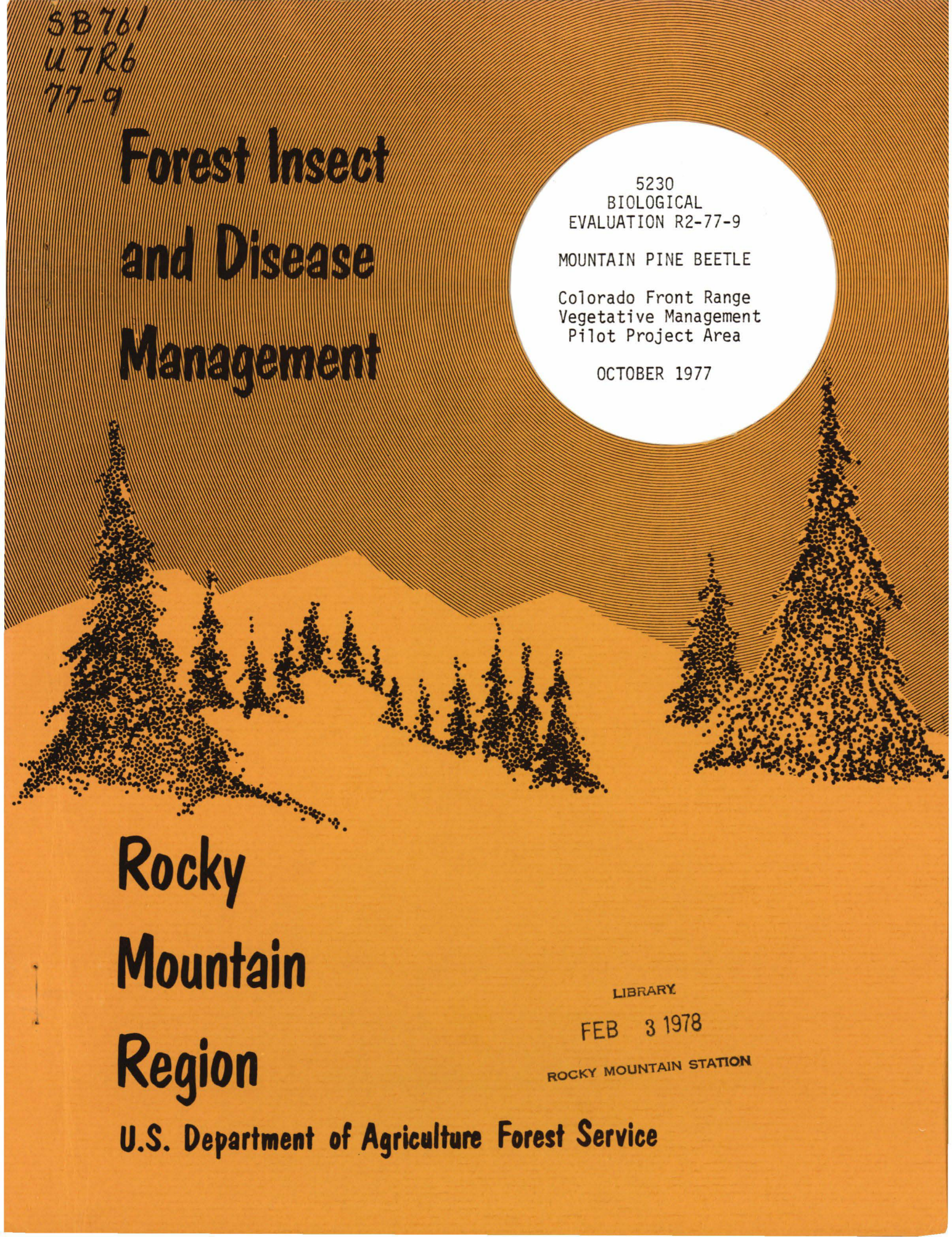
Forest Insect and Disease Management

5230
BIOLOGICAL
EVALUATION R2-77-9

MOUNTAIN PINE BEETLE

Colorado Front Range
Vegetative Management
Pilot Project Area

OCTOBER 1977



Rocky Mountain Region

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INTRODUCTION

The Colorado Front Range is the first timbered belt above the Plains on the east side of the Colorado Rocky Mountains. Geologically, the belt extends from the Wyoming State line south to include the Sangre de Cristo Mountains, Spanish Peaks and the ^{1/}Wet Mountains. Elevations range from 6,500 feet to 9,400 feet.

The Front Range has experienced repeated mountain pine beetle, *Dendroctonus ponderosae* Hopkins, epidemics since the early 1900's. The epidemics have, in general, progressively intensified. In 1976, it was estimated that over 1 million ponderosa pine, ^{Pinus} *ponderosa* Laws, were killed by the mountain pine beetle. ^{2/}

The extensive losses have brought about much public concern, not only from private landowners who have lost trees, but from that portion of the public using State and Federal lands. Currently, the U. S. Forest Service and Colorado State Forest Service are implementing a vegetative management pilot project on the Colorado Front Range. Ponderosa pine stands on the Front Range are not healthy and are highly susceptible to beetle infestations. The vegetative management project will improve the health and vigor of the ponderosa pine stands and reduce the susceptibility of the stands to mountain pine beetle epidemics.

The pilot area encompasses 34,000 acres extending west and southwest from the west edge of the City of Boulder to the Peak to Peak Highway. This area has been set up as an initial test area to determine the feasibility of extending vegetative management practices over most of the Front Range.

^{1/}

Myers, C. A. 1974. Multipurpose Silviculture in Ponderosa Pine Stands of the Montane Zone of Central Colorado. USDA Forest Service. Rocky Mountain Forest and Range Experiment Station. Research Paper RM-132. 15 pp.

^{2/}

Creasap, V. L. M., C. D. Minnemeyer. 1976. Mountain Pine Beetle. Colorado Front Range. USDA Forest Service. Rocky Mountain Region. Bio. Eval. R2-76-9. 11 pp.

In late June, 1977, a mountain pine beetle brood survey was conducted to evaluate the overwintering population and predict the trend of the infestation for 1977. Utilizing Knight's (1960) Sequential Sampling Plan, ^{3/} which is based on bark samples, the trend of the current infestation was determined at different locations within the pilot area. Brood samples of six of the seven locations showed that the population is increasing. Samples were taken on National Forest lands by personnel from the U. S. Forest Service, and private lands by personnel from the Colorado State Forest Service.

TECHNICAL INFORMATION

CAUSAL AGENT: *Dendroctonus ponderosae* Hopkins, mountain pine beetle

HOST: *Pinus ponderosa* Laws, ponderosa pine

LIFE HISTORY: The mountain pine beetle has one generation per year. Adults attack trees from mid-July through early September by boring through the bark to the cambium. The females then tunnel upward for 12 inches to 30 inches (these tunnels are called egg galleries). The females lay eggs in individual niches along each side of the gallery which is then packed with frass. After hatching, the larvae feed in individual channels (larval galleries) at right angles to the egg galleries in the phloem. The insect overwinters in the larval stage. In the spring, when the larvae are fully developed, they excavate an oval chamber at the end of the larval gallery (pupal chamber) and pupate. Finally mature adults emerge from the pupal chamber by boring through the outer bark and fly to attack new trees, completing the generation.

METHODS

In accordance with Knight's (1960) Sequential Sampling Plan, two 6 by 6-inch bark samples were taken at d.b.h. on opposite sides of

^{3/}

Knight, F. B. 1960. Sequential Sampling of Black Hills Beetle Populations. USDA For. Serv. Rocky Mtn. For. and Range Exp. Sta. Res. Note 48. 8 pp.

currently infested ponderosa pine trees at 7 locations within the pilot area. For each sample, the total number of brood, inches of egg gallery, number of egg gallery starts, number of each species of predators and parasites and degree of woodpeckering were tabulated. Activity of competitive species was also noted, in particular flat-headed wood borers, *Buprestidae*. Basal area of trees within each infestation area sampled, including infested and non-infested trees, was recorded. The beetle population was then categorized as decreasing, static or increasing.

RESULTS AND CONCLUSIONS

Six of the seven areas sampled showed an increasing trend for mountain pine beetle populations in 1977. The seventh area showed a decreasing trend. This area was on a poor site. Heavy interspecific competition with flat-headed wood borers was noted on this particular plot. Flat-headed wood borers also feed in the phloem. They are larger larvae than mountain pine beetle larvae and will not only consume wood, but any other larvae that get in their way. There was generally very little or no woodpeckering noted. In general, parasites, predators, woodpeckers and interspecific competition from flat-headed wood borers seems to be having little effect on the total mountain pine beetle population.

The summary of the brood sample data indicates that epidemic losses can be expected to continue within the pilot area. Some portions of the pilot area have had heavy losses from the mountain pine beetle and very little suitable host material is left. Further losses may be expected in portions of the pilot area where mortality has not yet been extremely heavy, and the stands are overstocked with susceptible size trees. The situation described above is very ^{4/}similar to that observed throughout the Colorado Front Range. ^{4/}

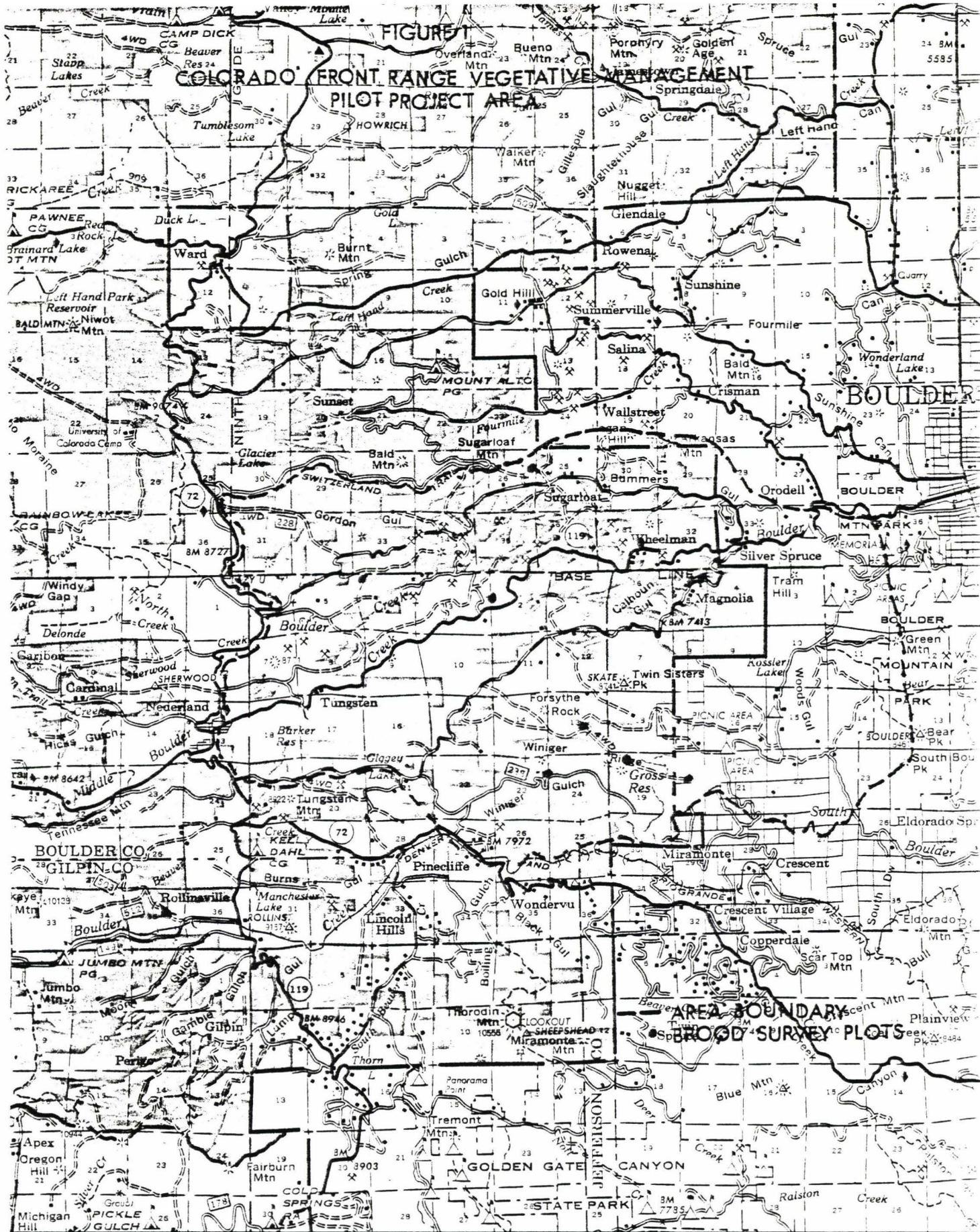
The recommended long-term protection measure to reduce susceptibility of stands to beetle attack is reduction of growing stock levels to 80, or less, depending on site. Silvicultural thinning will decrease competition between trees, eliminate weak, less vigorous trees and increase the vigor of the residual stand.

^{4/}

Creasap, V. L. M. 1977. Mountain Pine Beetle. National Forest Lands, Colorado Front Range. USDA For. Serv. Rocky Mtn. Region. Bio. Eval. R2-77-4. 7 p.

Forest Insect and Disease Management personnel will continue to monitor the population during the fall of 1977.

FIGURE 1
COLORADO FRONT RANGE VEGETATIVE MANAGEMENT
PILOT PROJECT AREA



R.73W.

CENTRAL CITY

R.72W.

R.71W.

1977 FRONT RANGE PILOT PROJECT AREA BROOD SURVEY

+ Figures are 1 standard err

AREA	NUMBER TREES	AVERAGE D.B.H. + S. E.	SAMPLES	BROOD	AVERAGE BROOD + S. E.	TOTAL STARTS	AVERAGE STARTS + S. E.	TOTAL INCHES OF GALLERIES	AVERAGE INCHES OF GALLERIES + S. E.	TOTAL CLERIDS (BEETLE LARVAE)	TOTAL MEDETERA (FLY LARVAE)	FLAT-HEADED WOOD BORER ACTIVITY	BA	TREND
Boulder Creek T. 1 N., R. 72 W. Sec. 26	10	16.37 + 1.34	20	322	16.10 + 2.60	57	2.85 + .27	632	31.60 + 1.77	8	5	Moderate	130	Increasing
Boulder Creek T. 1 N., R. 72 W. Sec. 33	7	13.57 + .30	14	454	32.43 + 5.79	29	2.07 + .25	416	29.71 + 1.73	2	1	Light	140	Increasing
Boulder Creek T. 1 S., R. 72 W. Sec. 3	6	12.98 + 1.04	12	349	29.08 + 5.07	21	1.75 + .30	250	20.83 + 1.60	0	0	Light	180	Increasing
Boulder Creek T. 1 S., R. 72 W. Sec. 4	23	11.67 + .56	46	526	11.43 + 1.54	101	2.20 + .21	949	20.63 + 1.24	0	0	Moderate	110	Increasing
Mid Boulder Creek T. 1 N., R. 72 W. Sec. 36	10	12.07 + .81	20	462	23.10 + 3.71	42	2.10 + .28	561	28.05 + 2.21	1	15	None	120	Increasing
Winiger Gulch T. 1 S., R. 72 W. Sec. 23	10	10.77 + .85	20	391	19.55 + 3.41	51	2.55 + .14	621	31.05 + 2.02	4	5	None	110	Increasing
Boulder Creek T. 1 S., R. 71 W. Sec. 4	23	11.93 + .54	46	119	2.59 + .54	58	1.26 + .13	1,041	26.63 + 1.14	4	0	Heavy	100	Decreasing
TOTAL OR AVERAGE	89	12.53 + .40	178	2,623	16.63 + 1.97	359	2.13 + .15	4,470	25.93 + 1.16	19	26	Light	127	Increasing